

KOEHLER KORNER

A nameless friend of mine was out flying his RV a few days ago, and just as he was about to do some acrobatics there was a loud bang out of the engine, and it promptly quit! He was at 3500 feet and always tried to do acro near enough to a field so that in the event of an engine problem, he could glide into the field, which he successfully did. Pilot and plane were undamaged. Wings were removed and the plane was brought home where the investigation of the engine failure began.

First thing noted was that the prop rotated normally and the “armstrong” method of compression testing indicated that all the cylinders seemed to be operating normally. However, this engine, an experimental version of a Lycoming IO-360-A series engine, has two impulse couplings and only one was firing! This indicated that something was wrong with the gear train. In most Lycomings there is a rather small gear on the back of the crankshaft that drives two idler gears, one on each side. The idler gear on the right drives the right mag, and if used, the vacuum pump gear and a prop governor gear. On the left side the idler gear drives the left mag and the camshaft. Also, the left idler gear has a cam shape on its back side that pushes on a rod that then actuates the AC type fuel pump on the lower left side of the accessory case.

By holding a hand on each mag and rotating the prop it was obvious that the left mag’s impulse coupling was not firing. The mag was removed and it was easy to see that the gear that was supposed to be rotating the mag was not moving! At this point it was obvious that there was something seriously wrong with the gear train inside the accessory case. It had to be opened-up. So, the engine had to come off the plane and the sump and accessory case had to come off.

Inside the sump about a 160° segment of the left idler was found in one piece! When the accessory case cover came off, the rest of the gear was found. Here is a picture of the gears as found:



All of the gears were removed, except the one at the very top. It is the cam gear and is forged integral with the cam. To remove it would require splitting the case. The owner chose to not remove it. All of the intact removed gears were magnafluxed and no cracks or other damage were found. A replacement gear was found for well north of \$500 and the bolt (\$50!) and locking plate in the center of the small crank drive gear were replaced. New gaskets were purchased along with new engine mounts (it was time) and a new fuel pump (precautionary).

Now remember that this was an experimental engine with an experimental sump/induction system all on an experimental aircraft, so strictly speaking, the owner does not have to comply with Lycoming related Airworthiness Directives (ADs). In the Certificated world there is definitely an applicable AD associated with the drive gear and its mounting hardware. The latest AD is 2004-10-14 which requires removal and inspection of the crank drive gear and replacement of the mounting bolt and lock plate IF the crankshaft is subjected to a

sudden stoppage due to a prop strike. I invite you to look up the AD and review its unique definitions that require the inspection/replacement. The Lycoming associated Mandatory Service Bulletin is MSB No. 475C. Again, I invite you to read this SB. The owner elected to follow its guidance and have everything inspected and/or replaced. All items passed. The new 5/16" bolt that is just one inch long costs \$50! It is STD-2246 and no suitable alternative is available or authorized.

We are currently awaiting parts that should arrive in the next couple of days, but I do not see any major issues with this plane not being back flying in a week. Thought you would enjoy the story, slightly incomplete as it is.

Oh, what caused this? Turns out the owner had the left mag come loose about 20 hours ago and fall out of the case. It appears that as the mag gear tipped it jammed one of the teeth on the left idler gear breaking it off. There was enough gear mesh for the idler gear to keep the gear timing correct, but the gears were probably not meshing smoothly and eventually this bad meshing resulted in a structural overload that broke the gear! It is perhaps sobering to consider that this aircraft within the past year had made a major over water flight.

I can't resist adding another picture that shows the broken piece in place and the missing tooth. You can see the timing alignment dots on the broken part of the gear, just above the crank drive gear.



I hope this discussion of how the gears work (or don't) on your Lycoming will help you more successfully maintain and fly your plane.

Keep building, flying, and maintaining.

Dick

04/2026